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## PSYCHOLOGICAL LITERATURE.

*Zur Analyse der Unterschiedsempfindlichkeit.* Experimentelle Beiträge von LILLIE J. MARTIN und G. E. MUELLER. Leipzig, J. A. Barth, 1899, pp. vi, 233.

Probably all psychologists who are accustomed to reflect seriously on what they have experienced in judging small differences of stimuli, have felt that the usual rules laid down in the psychophysical methods for the elimination of constant errors, were treating in a very abstract and mechanical manner extremely complicated and more or less erratic processes. That like stimuli should seem to vary quantitatively and qualitatively from day to day, that periods of ease and of difficulty in comparing stimuli should follow one another intermittently, that now one order of standard and variable should be easier to 'judge' and later on the reverse order, are matters which, psychologists are beginning to feel, are not to be put aside with a reference to 'probable indisposition of reagent' or to 'some disturbances in the course of experimentation,' but are themselves subjects for investigation. That is, there are signs that psychologists are coming to feel their next concern is not with further determinations of sensitiveness to difference and with the mathematical elaborations of the psychophysical methods based on the laws of large numbers, but with the complicated psychological processes underlying the method, and a very solid and valuable expression of this feeling is to be found in this *Analyse* of Martin and Müller.

The method of right and wrong cases, or, as the authors prefer to call it of "constant differences" is the peg on which the investigation is hung; but, as stated in the preface, the object was not the massing of results for determining some "so-called sensitiveness to difference," but the analysis of the physiological and psychological factors by means of which the results themselves were determined.

Suppose in an investigation for determining sensitiveness to difference for 'hefted' weights with the usual reversal of time and space order which is supposed to eliminate time and space errors, the investigator having collected his results, should run against a summary like this:—

### SUMMARY OF JUDGMENTS (p. 101).

Order I. Standard-Variable: lighter 203 times: like 479 times: heavier 214 times:  
Order II. Variable-Standard: " 106 " " 561 " " 229 "

According to orthodox views of error elimination, if there is practical equality of "lighter" and "heavier" in Order I, there should be in Order II; or, if there are more "lighter" judgments in I than in II, there ought to be correspondingly more "heavier" judgments in II: but the "heavier" in I about balance those in II.

When the aim of the investigator has been to determine sensitiveness to difference he has not usually thought it necessary to discuss this condition of results, but has passed rapidly on to the consideration of the relative numbers of right, wrong and doubtful cases, to determinations of sensitiveness and thence to 'laws.' The investigation of such anomalous conditions as appear in the above summary is the main object of the present research, and the results must directly affect the validity of the method of right and wrong cases so far as it

rests on experiments with 'hefted' weights, and indirectly its validity with other kinds of stimuli. The working conditions were essentially those of Müller's earlier work with Schumann.<sup>1</sup> One hand was used and the judgment was referred to the second weight. The standard weight ranged from 416 to 3,221 grams. and for each standard there were usually 7 variables,—three above, three below and one like the standard. The height of lifting was limited by a taut horizontal string, and the time was determined by a metronome. The authors chose this method in preference to Wreschner's physiologically simpler arrangement, partly because they wanted to follow out Müller and Schumann's line of work, and partly because they preferred to experiment on a 'natural' every-day movement. The reagents were directed to deliver their judgments under the heads of 'larger clearly,' 'larger' 'undecided' 'smaller' and 'smaller clearly.' The discussion of the various forms of judgments tried and the reasons for adopting the above categories would form good prolegomena to some future handbook on psychophysical methods of measurement. The attitude of the reagent towards 'larger clearly' *e. g.*, was quite different from that towards 'clearly larger.' 'Undecided' comprehended all cases when reagents did not feel sure of a 'larger' or 'smaller,' together with the comparatively few cases of a positive conviction of 'like.'

The deviations from a symmetrical grouping of results as shown, *e. g.*, in the above 'summary of judgments,' are due to factors in the process of comparing which are analyzed under the heading of "Anomalous differences in the numbers representing right judgments." The first of these "anomalous differences" is shown in the fact that more right judgments are given when the variable comes second than when it comes first (Order I); this holds good whether the variable is greater or less than the standard. The influence producing this effect is termed the general tendency of judgment; it is present in all reagents, and comes from the prevalence of *absolute* impressions of heaviness or lightness,—*i. e.*, impressions in which no comparison with another definite weight takes place any more than when in lifting a book or letter we call it heavy or light. The heavier the variable the more active the tendency. The evidence for the existence of such absolute impressions comes, of course, from the reagents who in many cases were not aware of a trace of a comparison with the standard weight. One reagent remarked: "If I decide that a weight is clearly greater or smaller than another, the judgment does not rest on a difference in the weights, but chiefly on the fact that the weight appears to me in a general way very large or very small." (p. 45.) Under these conditions one might expect a tendency in case of the order variable-standard to call the variable lighter or heavier before the standard was touched; this was the case with some reagents, and the tendency rather increased than diminished with practice. With many reagents it was found that the judgments were given with the maximum feeling of ease and security when the variable followed the standard. These and similar statements the authors hold are only to be explained on the theory of 'absolute impressions.'

Another irregularity noticed in the distribution of right cases is termed the anomaly of type. Some reagents gave more right judgments when standard > variable, and others when standard < variable. The first class was of the positive type:—it was made up of five men and one woman—that is of comparatively muscular individuals, the one woman being well exercised in household work. The second class was made up of five women and one man, that is of comparatively

<sup>1</sup> Müller und Schumann: Ueb. d. psycholog. Grundlagen d. Vergleichung gehob. Gewichte. *Pfäuger's Arch.*, XLV, 37.

weak individuals, the one man having a slight muscular development. These conditions, along with the tendency to judge from absolute impressions, readily explain the anomalies of type. The strong or positive type, *e. g.*, would more easily get an absolute impression of "less" than of "greater," consequently would give more correct judgments when standard > variable. Obviously the influence of a type will work with the general tendency of judgment in one part of each order of standard and variable and against it in the other part.

The clear cases noted above under the headings of "larger clearly" or "smaller clearly" are obviously those in which the effects of absolute impressions should be most prominent, for in such cases there would be the least disturbance of conviction by comparison. In 'clear cases,' therefore, the type should stand out more conspicuously than in the total judgments. As a matter of fact the type can usually be determined by reference to the 'clear cases' when it is hidden in the total summaries. On page 231 the authors express the opinion that such absolute impressions probably take place with other kinds of sensations, in which case the accuracy of judgment must be fairly independent of the time-interval between standard and variable. In some experiments with clangs, carried out a few years ago,<sup>1</sup> to get some insight, if possible, into the nature of the so-called memory-image, which plays so heavy a part in the explanation of memory experiments, the writer found that for time-intervals from 1 sec. up to 60 sec. there was but little falling off in accuracy of judgment with increase in time for differences of stimuli (8 and 4 vibrations). Finding, moreover, that judgments were delivered with more ease and a feeling of security for time-intervals filled with absorbing distraction, and that the distraction did not strongly or regularly affect the number of correct judgments, the experimenters came to the conclusion that for the most part no comparison of standard and variable took place; *i. e.*, that the judgments were based on 'absolute impressions' as Martin and Müller term them.

As the direction of general judgment and type tendencies depend on the time order of the stimuli, they may be considered as parts of the general or resultant time error, though unlike the ordinary or Fechnerian time error they are not eliminable. The authors find in their results, however, an error which amounts to a positive or negative addition to the difference between standard and variable, according to their time order. They call this the Fechnerian time error, and attribute it to physiological causes — either fatigue or excitation, according to the strength and disposition of the reagent. According to its sign this time error may act with or against the general tendency of judgment, and with or against the type. The physiological nature of the error is evidenced by the fact that while the positive type may show either kind of Fechnerian time error, positive or negative, the negative type shows only the negative error.

These three factors — the general tendency of judgment, the type, and the Fechnerian time error together — will explain the contradictory figures given above, *i. e.* :

Standard = 440 grams ; Variables = 470, 460, 450, 440, 430, 420, 410 grams.

	Lighter.	Indiff.	Heavier.
Time Order I.....	203	479	214
Time Order II.....	106	561	229

If the 'clear' cases should be separated out from these judgments, the

<sup>1</sup> *Vide*, Angell and Harwood : Experiments on Determination of Clangs. etc., *Am. Jour. Psychology*, XI, 1899, 67 ff.

positive type would appear, *i. e.*, more right cases would be found in these clear judgments when standard > variable than under the reverse condition. Distributing to each of the seven values of the variable the actual number of judgments falling on that variable, classified according to the judgment categories of "heavier clearly," "heavier," etc., one gets a table showing the direction of the Fechnerian time error. For instance, with standard and variable alike (Difference  $D = 0$ ) more judgments of 'larger' fell on the variable in Time Order I, and more on the standard in Time Order II. *i. e.*, the Fechnerian time error is "negative."

Accordingly, in the above summary the type and Fechnerian time error are opposed in Time Order I, so that the "lighter" and "heavier" judgments almost balance, the slight excess of "heavier" (203 : 214) indicating possibly that the Fechnerian time error tendency is slightly stronger than the type. The general judgment tendency is, of course distributed equally over both "lighter" and "heavier." In Time Order II the influence of type and time error is in the same sense, *i. e.*, towards judgments of "heavier;" and the result is a very great falling off in 'lighter' judgments.

In analyzing out these several tendencies the authors used two kinds of tables: a series of "Summaries of judgments" similar to that given above, and another of the distribution of right cases under the several categories of judgment for each value of  $D$  (difference of standard and variable). Each kind of table brought out tendencies hidden in the other, and, what is especially valuable in so great a complication of factors, each serving, in a measure, as a check on the other.

The effect of practice also turned out to be very different from what might be anticipated. So far from the results becoming more regular with practice, they sometimes changed character entirely—a negative type becoming positive, and *vice versa*. It was shown later that a reagent's measure of conviction for delivering a certain kind of judgment did not remain the same. In general, the authors assert (p. 134) that the effects of practice are harder to determine than any other subsidiary tendency.

What part is played in these judgments by an actual comparison of standard and variable? The answer to this question is somewhat surprising. "We are by no means of the opinion," the authors say (note, p. 49), "that a comparison of weights never takes place. Those comparisons, however, which are the easiest to determine, are, strange to say, not comparisons between the standard and its variables, but a comparison between a variable which has just been 'hefted' and the variable of the immediately preceding experiment." For example, one of the reagents said: "Just as I was about to say 'greater clearly' I remembered that the preceding judgment was based on a sensation which was greater than the one just experienced, and so for the latter I merely said 'greater,'" (p. 155).

The tendency expressed in notes of this kind was investigated by means of control experiments (*Vexir-Versuche*). In a series of eight variables, *e. g.*, three were like the standard, the remaining five forming an arithmetical series, all larger, or all smaller than the standard, as the case might be. The object of the arrangement was to determine the effect of preceding impressions of "heavier" or "lighter" on the central experiments. The effect of a preceding difference producing say the correct judgment 'smaller,' was to produce a tendency towards 'larger' judgments when the standard was equal to the variable, and in general this tendency was the more marked the greater the preceding difference. For example, with a standard of 485 grams, the preceding variable 460 produced 18 'greater' judgments in the central

experiments, whilst 410 as preceding variable produced 35 "greater." As was to be expected from the above results a similar influence affected the general experiments; analysis of the data shows that judgment of the smaller values of  $D$  was influenced by preceding greater values of  $D$ .

In this case of 'indirect comparison' the comparison takes place between single perceptions; another form of 'indirect comparison' which may disturb the first is due rather to a comparison of differences, and this results in a change of criterion for any given form of judgment; if, for example, the actual differences between standard and variable are very large the reagents will, so to speak, become accustomed to a stricter criterion in applying the judgments "larger" and "smaller," so that their judgments will be given only through some very clear impression of greater or smaller. The result will be that the mistakes of judging the control experiments as 'larger' or 'smaller' will rarely be made. (p. 171.) A confirmation of this is found in Kämpfe's investigation, (*Phil. Stud.*, VIII, S. 549) in which control experiments were used. The greater the actual difference between standard and variable the less the errors of judgment in the control experiments; and the less the value of  $D$  the greater the number of errors for the cases when  $D = 0$ .

Excluding errors of space order there are then, according to this analysis, no less than five possible influences at work in determining judgments on 'hefted' weights when all outer and inner conditions are made as constant as possible.

1° The general tendency of judgment, resulting in more correct judgments when the variable follows the standard.

2° Influence of the type—positive and negative.

3° Influence of the Fechnerian time error—positive and negative.

4. Influence of size of variable in preceding judgment.

5. Influence of change of criterion for delivering judgments. Of all these the only one that is theoretically eliminable is the Fechnerian time error.

A complete investigation of space errors was not contemplated by the authors. Experiments involving space errors were, however, carried out with reference to the type tendencies. It was found that either position (right or left) might be positive or negative in the Fechnerian sense.

Other interesting points developed by the experimentation were the compensation effects, on the judgments, of reference to the first or second weight, the influences of partial knowledge of the conditions of experimentation, and of the conditions affecting the time of delivering a judgment. As a whole the work contains material enough for half a dozen ordinary *Arbeits*.

But despite the many factors analyzed out by the authors one rarely feels he is on shaky ground, partly because the results agree when looked at from different standpoints, and partly because the conclusions fit in with common sense views, as in the case of the unusually strong and weak types, or with tendencies which any observant psychologist has noticed in his own experience, as is the case with the absolute impressions and indirect comparisons.

In the preface, Prof. Müller states that a main purpose of the work is by means of criticism to contribute something towards dispelling the illusion that the complicated and difficult province of psychology is peculiarly that in which one can further scientific knowledge with a minimum outfit of acquirements and training. It is probably no injustice to Prof. Martin, who, as the preface states, really conducted the work, to surmise that the drastic criticism of Wreschner's

"*Methodologische Beiträge*," as well as the discussion of Cattell and Fullerton's "Small Differences of Sensation," proceed from the pen of Prof. Müller. Into these criticisms, as well as into a discussion of the support which this *Analyse* gives to Müller and Schumann's theory of 'hefted' weights, this is hardly the place to enter, as the object of this paper is to give, if possible, an intelligible résumé of a work which is as uncommonly hard to read as it is uncommonly rich in acute and sound psychological analysis.

F. ANGELL.

## SOME RECENT ITALIAN PSYCHOLOGICAL LITERATURE.

By ALEXANDER F. CHAMBERLAIN.

In these brief abstracts and review-notes of recent Italian psychological literature no attempt has been made to cover the entire field, or to go into details of facts and technicalities, but simply to give in a few words some of the more important points discussed, theories advanced, suggestions made, and contributions of value added to the literature of the subjects treated. The topics considered are such as have appealed specially to the present writer.

*Riddles.* Dr. V. Giuffrida-Ruggeri<sup>1</sup> has found the "riddle," that test play of the folk, worthy a psychological study,—the foundations for such an investigation were laid long ago in the encyclopædic collections of Pitre, the *doyen* of Italian folklorists. It is in the riddle that is "poetically hidden" the wisdom of the folk-soul. The author attempts a classification of riddles, from the psychological point of view into: Descriptive, observational, instructive, emotional, imaginative, humorous. These popular riddles are a means by which we can get at "the contents of parents' minds," to a certain extent at least.

*Imagination.* Elsewhere<sup>2</sup> Dr. Giuffrida-Ruggeri discusses in rather brief fashion the "Evolution of the Imagination." Accepting the definition of Binet ("the imagination is the faculty of creating groups of images which do not correspond to any exterior reality"), he so interprets it as to exclude the traditional distinction between the "reproductive" and the "constructive" imagination, made so much of by Spencer and his disciples in psychology. It is doubtful if the so-called "reproductive imagination" is essentially different from ordinary association and memory. According to the author the evolution of the imagination is from the simply objective to the schematic, then from the schematic to the symbolic. Its course is from the primitive chaotic phantasmagoria to the symbolism that not infrequently falls a victim to involution. The history of the race and the development of the individual illustrate this evolution of the imagination. In its first stages at the beginning imagination is not very unlike the *rêverie* of a long repose. Indeed "the luxurious cycle of ancient Greek legends, a real spring-time of voluntary illusions, corresponds to what dreams are in the life of the individual, a true type of hallucinations and metamorphoses." This Greek metamorphosis is not only a transition from the known to the unknown, an extension of an anterior consciousness, but was perhaps the first classification ever

<sup>1</sup> Il valore psicologico dell' indovinello. Un' inchiesta sull' ideazione popolare. Riv. di Psicol., psich., e neurop., Vol. VI., pp. 1-4.

<sup>2</sup> L'evoluzione dell' immaginazione. Arch. per l'Antrop. e la Etnol. (Firenze), Vol. XXVIII (1898), pp. 197-206.